SG100KC

PV Grid-Connected Inverter

Installation Manual

SG100KC-IEN-Ver13-201202 Version: 1.3

About This Manual

Thank you for purchasing the SG100KC from Sungrow Power Supply Co., Ltd. We hope you will be satisfied with this device along with your entire PV plant system.

Aim

The aim of this manual is to give safety instructions and detailed setup information for the installation of SG100KC PV grid-connected Inverter.

Target Readers

This manual is provided to people who need to set up a system that includes the SG100KC grid connected inverter. Installers must be qualified electricians only.

How to Use This Manual

Read this manual and other documents, before installation of the SG100KC.

This document must be stored near the installation and must be available at all times.

The contents of this manual will be periodically updated or revised when necessary. However discrepancies cannot be excluded. Please refer to the product or download the latest version of this manual via www.sungrowpower.com.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

Symbols Explanation

Important instructions contained in this manual should be followed during installation of the inverter. They will be shown by the following symbols.

DANGER indicates a hazard with a high level of risk which, if not avoided, will result in deadly or serious injury.

WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

NOTICE indicates a situation which, if not avoided, could result in equipment malfunction or property damage.

NOTE indicates additional information, emphasized contents or tips to help you solve problems or save time.

Contents

1 Safety Instructions 1

1.1 Appropriate Usage 2
1.2 Safety Instructions 3
1.3 Emergency Stop Button 5
1.4 Grid (AC) Main Switch 5
1.5 DC Main Switch 6
1.6 Open the Door of SG100KC 6

2 Delivery 7

2.1 Scope of Delivery 8
2.2 Identify SG100KC 9
2.3 Storage of SG100KC 10

3 Introduction 11

3.1 Basic Structure and Appearance 12
3.2 Dimensions and Weight 14
3.3 The Bottom and Top Views 15
3.4 Electrical Connections Interface 16
3.5 Data Acquisition 17
3.5.1 Data Display 17
3.5.2 Fault Indication 17
3.5.3 Serial Data Access 17
3.6 General Requirements 17
3.6.1 Grid Requirements 17
3.6.2 Ventilation Requirements 17
3.6.3 Installation Requirements 17
3.6.4 Personnel Requirements 18
3.6.5 Communication Requirements 18

4 Installation Design 19

4.1 The Solution with Optional Devices from SUNGROW 20

4.2 Basic Requirements 21
4.3 Installation Environment Design 21
4.3.1 Floor 21
4.3.2 Clearance Space 22
4.3.3 Cable Trench 22
4.3.4 Ventilation 23
4.3.5 Other Protections 23
4.4 Wiring Specification 24
4.5 Tightening Torques and Cable Protection 25
4.5.1 Tightening Torques for Power Cable Connections 25
4.5.2 Cable Protections 25
4.6 Installation Process 25
5 Preparations for Installation 27
5.1 Checking the Unit 28
5.2 Required tools 28
6 Mechanical Installation 29
6.1 Transport and Shipping 30
6.1.1 Attentions 30
6.1.2 Moving the Packed SG100KC 31
6.2 Field Installation 35
6.2.1 Unpacking the Unit 35
6.2.2 Place the SG100KC 36
6.2.3 Fastening the SG100KC to Floor 36
7 Electrical Connection 37
7.1 Cable Specifications 38
7.2 Parts for Cabling 39
7.3 Start Electrical Connections 40
7.3.1 Open the Door 40
7.4 Open the Cable Holes 41
7.5 DC Connections 42
7.6 AC Grid Connections 44
7.7 Ground Connections 45
7.8 Communication Connection (Optional) 47
7.9 Close the Cable Holes 48
8 Installation Checklist 49
9 Commissioning 51
9.1 Requirements of Commissioning 52

9.2 Inspection before Start-up 52
9.2.1 PV Array Check 52
9.2.2 SG100KC Check 52
9.2.3 Ground Connection Check 52
9.2.4 Serial Communication Check (Optional) 53
9.2.5 Voltages Check 53
9.3 Start the Inverter 53
9.4 Complete the Commissioning 54
10 Appendix 55
10.1 Technical Data 56
10.1.1 DC Parameters 56
10.1.2 AC Parameters 56
10.1.3 System 57
10.1.4 Display and Communication 57
10.1.5 Mechanical Parameters 57
10.2 Exclusion of Liability 58
10.3 About Us 59

Figures

Fig 1-1 PV Generation System with SG100KC 2
Fig 2-1 Nameplate 9
Fig 3-1 Simple Circuit Diagram of SG100KC 12
Fig 3-2 External Appearance of SG100KC 13
Fig 3-3 Dimensions and Weight of SG100KC 14
Fig 3-4 Bottom View of SG100KC 15
Fig 3-5 Top View of SG100KC 15
Fig 3-6 Electrical Connections Interfaces of SG100KC 16
Fig 4-1 The Solution from SUNGROW 20
Fig 4-2 Clearance Space around the SG100KC 22
Fig 4-3 Sectional Drawing of Cable Trench 23
Fig 4-4 Installation Process of the SG100KC 26
Fig 6-1 Move the Packaged SG100KC 32
Fig 6-2 Move the SG100KC with the Wooden Pallet through a Forklift to 33
Fig 6-3 Move the SG100KC through a Forklift 33
Fig 6-4 Using Rail Steels or Crane to Move the SG100KC 34
Fig 6-5 Cross-section View of the SG100KC Fastened on the Wooden Pallet 35
Fig 6-6 Fastening the SG100KC 36
Fig 7-1 Power Cable Connection Terminal 39
Fig 7-2 Open the Main Switches 40
Fig 7-3 Open the Latch 40
Fig 7-4 Remove the Protective Shield 41
Fig 7-5 DC Input Cable Routing 43
Fig 7-6 AC Output Cable Routing 44

Fig 7-7 Ground Cable Routing 46
Fig 7-8 Serial Communication Cable Routing 47
Fig 7-9 Serial Communication Interface Connection 47

Tables

Table 1-1 System Devices Type 2
Table 2-1 Scope of Delivery 8
Table 4-1 Min. Distance between Control Cable and Power Cable 24
Table 4-2 Tightening Torques for Power Cable Connections 25
Table 4-3 Installation Process Descriptions 26
Table 6-1 Symbol and Data Name on Crate 31
Table 7-1 Recommended Sizes for DC Cables 38
Table 7-2 Recommended Sizes for AC Cables 38
Table 7-3 Recommended Sizes for Ground Cables 38
Table 7-4 Recommended Sizes for Communication Cables 39

1 Safety Instructions

About This Chapter

This chapter describes the appropriate usage and provides some important safety instructions about SG100KC.

1.1 Appropriate Usage

The grid-connected PV system consists of PV modules, grid-connected inverters, metering devices and a power distribution system (as shown in Fig 1-1).

Solar energy is converted into DC current by PV modules and is fed into the local power grid network by the grid-connected inverter which synchronizes the frequency, phase and pure sine waveform with the power network.

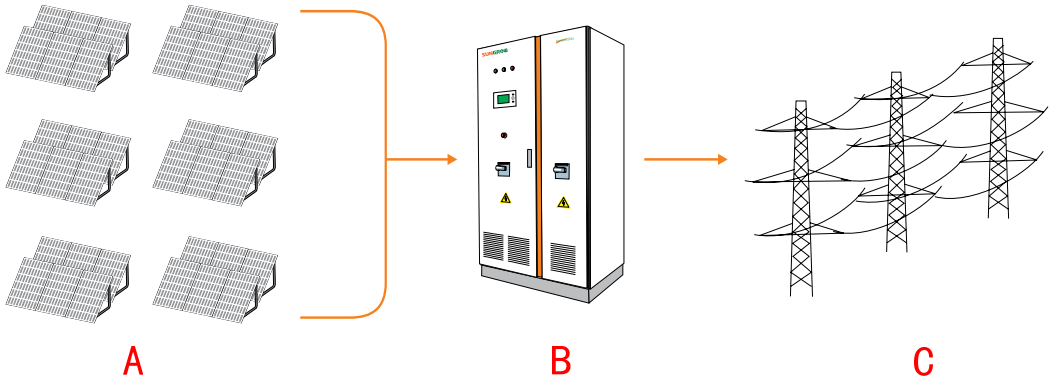


Fig 1-1 PV Generation System with SG100KC

No.	Description
A	PV Arrays
B	SG100KC PV Grid-Connected Inverter
C	Utility Grid

Table 1-1 System Devices Type

Device	Type
PV Arrays	Monocrystalline Silicon, Polycrystalline Silicon, Amorphous Silicon, Thin Film Cells
Utility Grid	TT, TN-C, TN-S, TN-C-S, IT
Optional Devices	Solar Info EM Environment Monitoring Device SunBox PVS PV Array Combiner Box SunBox PMD-D DC Power Distribution Cabinet SunBox PMD-A AC Power Distribution Cabinet Solar Info Logger Inverter Data Acquisition and Transmission Device

1.2 Safety Instructions

Pay attention to the following safety instructions:

Shock Hazard!

Death results from burns and electric shock upon touching the SG100KC live components.

- **Do not touch the live components of the SG100KC.**
- **Observe all safety regulations.**

Shock Hazard!

The enclosure of the SG100KC inverter may contain high voltage conductors. The enclosure doors should be kept locked during operation, except for maintenance or testing.

To avoid the risk of electric shock, do not perform any action or operation which is not included in the operating instructions unless you are qualified to do so.

Shock Hazard!

The SG100KC inverter will immediately shutdown if users want to open the front door during operation.

Please check whether the unit is thoroughly shut down and isolated from the public grid and PV arrays before opening the front door.

To avoid the risk of electric shock, a minimum of 5 minutes is needed for any stored potentials that are still left in the inverter after shut-down to be discharged before opening the door.

DANGER

Lethal Voltage!

Damage to the SG100KC may result death by electric shock or fire!

- **Only operate SG100KC when it is safe to do so!**
- **Only operate SG100KC when no damage is visibly apparent!**

DANGER

DC Voltage!

The PV array will provide DC voltage to the inverter when exposed to light, which may cause an electrical shock during installation, wiring or maintenance if not covered.

WARNING

Limitations of Use!

The SG100KC PV grid-connect inverter is not intended for use in connection with life support systems or other medical equipments or devices.

WARNING

- **Do not install on or over combustible surfaces.**
- **More than one live circuit, see diagram.**

CAUTION

For use in a controlled environment, refer to manual for environmental conditions.

CAUTION

ESD Protection!

The SG100KC may be damaged irreversibly by electrostatic discharge (ESD) at its components.

- **During the operation of SG100KC, please observe all the ESD related safety regulations!**
- **Discharge any ESD by touching the grounded SG100KC conductor before contacting any electronic components!**

NOTICE

Service Safety!

Thoroughly inspect the equipment prior to energizing. Verify that no tools or equipment have inadvertently been left behind.

NOTICE

Never work alone when servicing this equipment. Two persons are required until the equipment is properly de-energized, locked out and verified de-energized with a meter.

NOTE

Please keep this installation manual and other related documents in a handy place near the SG100KC.

These documents must be available to operators and maintenance personnel at all times.

1.3 Emergency Stop Button

The Emergency stop button will shutdown the inverter (disconnects the AC contactor and stops the IGBT matrix) immediately when it is punched (pressed down).

The inverter must be started up manually through the LCD control menu if users want to recover the operation after the button is punched.

1.4 Grid (AC) Main Switch

The grid main switch is one of the primary disconnects for the inverter. The inverter's doors cannot be opened until the switch of the grid main switch is in the OFF position. When the AC main switch is in the OFF position, all AC power is disconnected (not live), except the input side of the AC circuit breaker (the utility grid)

To operate the inverter the AC circuit breaker switch must be in the ON position.

1.5 DC Main Switch

The DC main switch is also the primary disconnect for the inverter. The inverter's doors cannot be opened until the switch of the DC circuit is in the OFF position.

When the DC main switch is in the OFF position, all DC power is disconnected (not live), except in the DC input terminals (if the PV array is connected and energized)

To operate the inverter the DC circuit breaker switch must be in the ON position.

1.6 Open the Door of SG100KC

Use the following procedure to shut down the SG100KC inverter before servicing:

1. Stop the inverter from the LCD control menu.
2. Switch off the AC main switch (turn the switch to the OFF position)
3. Switch off the DC main switch (turn the switch to the OFF position).
4. Press in the handle to make it pop out from the lock hole and turn it to the right.
5. Now you can open the front door.

2 Delivery

About This Chapter

This chapter provides the scope of delivery of SG100KC, nameplate and storage method.

2.1 Scope of Delivery

The following materials in Table 2-1 should be included in the crate.

Table 2-1 Scope of Delivery

No.	Name	Note
1	SG100KC PV Grid-Connected Inverter	Including key and parts for cabling
2	SG100KC Installation Manual	-
3	SG100KC Operation Manual	-
4	Warranty Card	-
5	Certificate of Quality	-
6	Product Test Report	-

NOTE

User can download the latest version of this manual and the monitoring software via www.sungrowpower.com.

2.2 Identify SG100KC

You can identify the SG100KC from the nameplate. There are two nameplates located on the back panel and inside the door as shown in Fig 2-1.

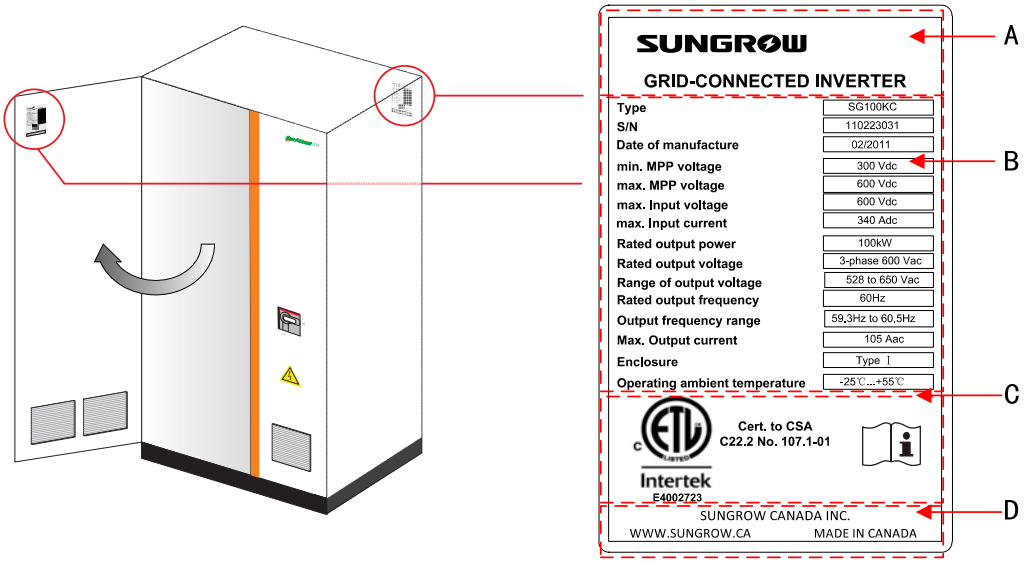


Fig 2-1 Nameplate

*The picture is for reference only; the actual item is standard.

No.	Description
A	SUNGROW Logo and product type
B	Parameters
C	Marks of certification institutions of SG100KC
D	Company name, website and origin

2.3 Storage of SG100KC

If there is a long time before installation or operation, the SG100KC should be stored appropriately.

- Pack the SG100KC up in the crate.
- Keep the desiccant bags in the crate.
- The SG100KC can only be stored when it is stopped and all the doors are closed in a dry room to protect the internal circuits against dust and moisture.
- Perform a routine check at least once a week.
- Unpack check and change desiccant bags every 6 months.

Keep the crate upright.

No stacking on top of the crate.

After long term storage, a thorough test of the SG100KC is necessary.

3 Introduction

About This Chapter

This chapter provides basic information about SG100KC.

3.1 Basic Structure and Appearance

The SG100KC is an advanced and reliable three-phase grid connected inverter for solar power generation systems with a rating of 100kW.

The SG100KC inverter utilizes the advanced power conversion technology with the latest IGBT, to convert the DC power from the photovoltaic array to stable three-phase AC power and then feed the power to the utility grid through a filter and isolation transformer, see Fig 3-1.

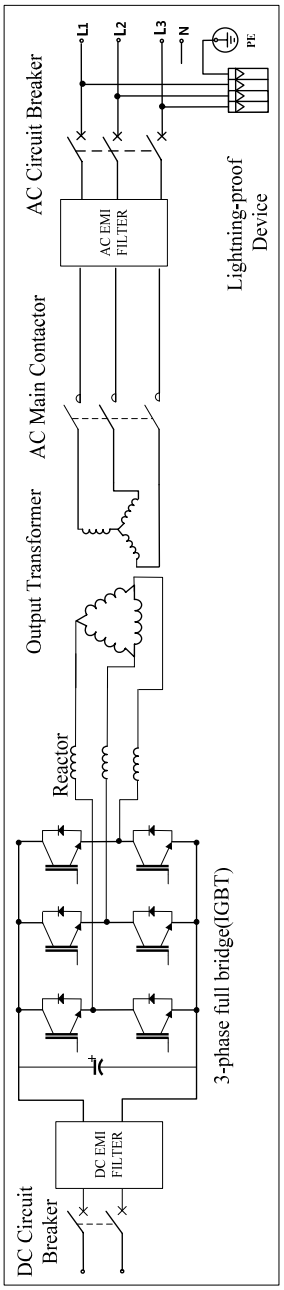


Fig 3-1 Simple Circuit Diagram of SG100KC

Fig 3-2 shows the locations of basic controlling and information display elements that help users perform control and monitoring tasks.

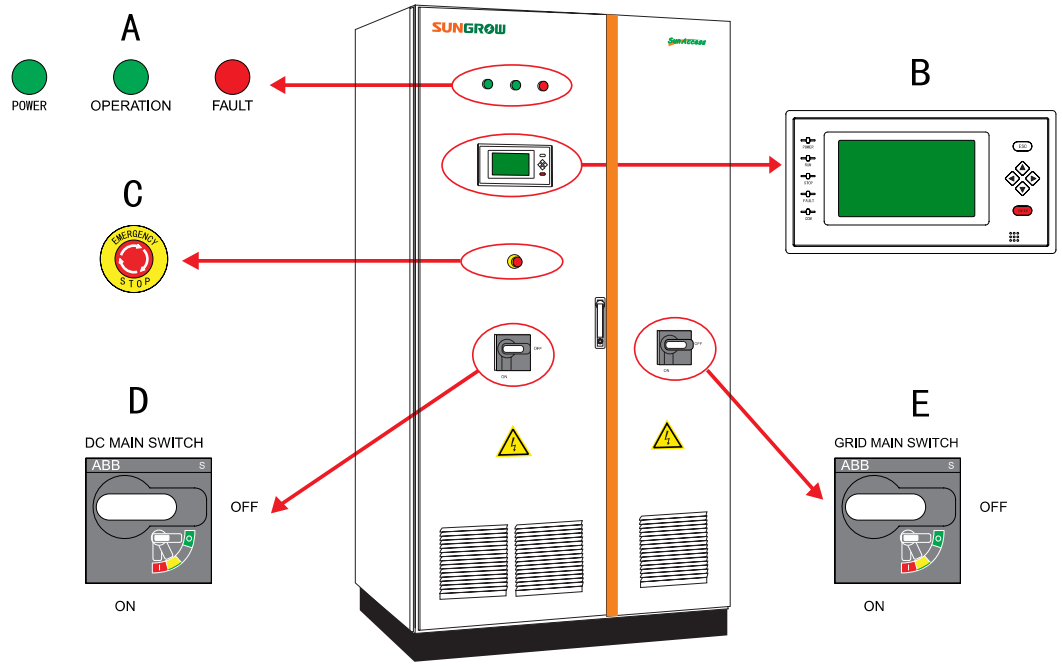


Fig 3-2 External Appearance of SG100KC

No.	Component Name	Comments
A	LED Indicators	Power, Operation and Fault
B	LCD and Keys	Display data and perform control functions
C	Emergency Stop Button	Shut down the inverter when pressed down
D	DC Main Switch	DC side circuit breaker switch
E	GRID Main Switch	AC side circuit breaker switch

3.2 Dimensions and Weight

The SG100KC inverter's dimensions are 40inchx77inchx30inch (1020mmx1964mmx770mm, W×H×D, including the devices on the front panel). The SG100KU inverter weighs approximately 1984 lbs (900 kg). Please take this large dimensions and heavy weight into consideration during shipping, moving and installation.

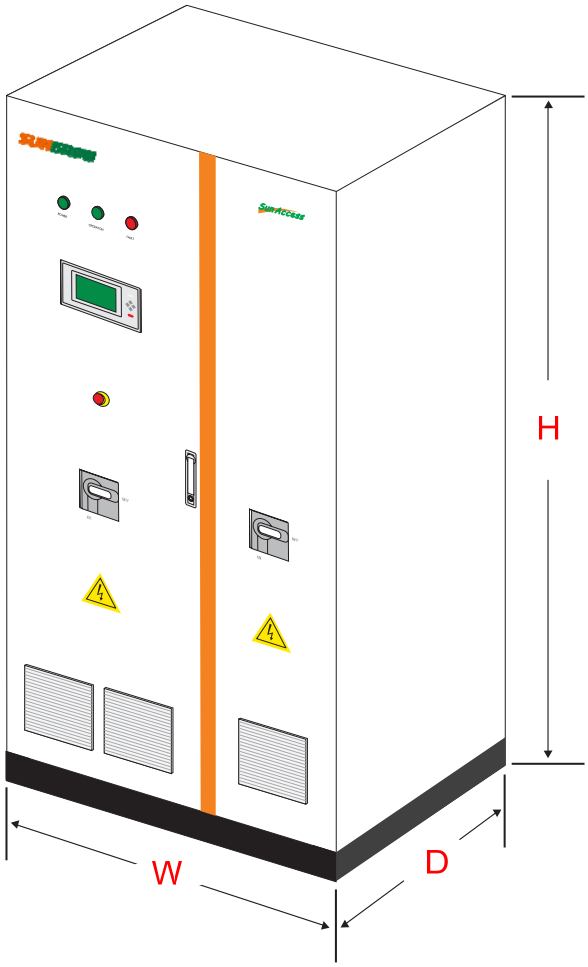


Fig 3-3 Dimensions and Weight of SG100KC

3.3 The Bottom and Top Views

Cables and cooling air can come into the cabinet through the bottom panel, see Fig 3-4.

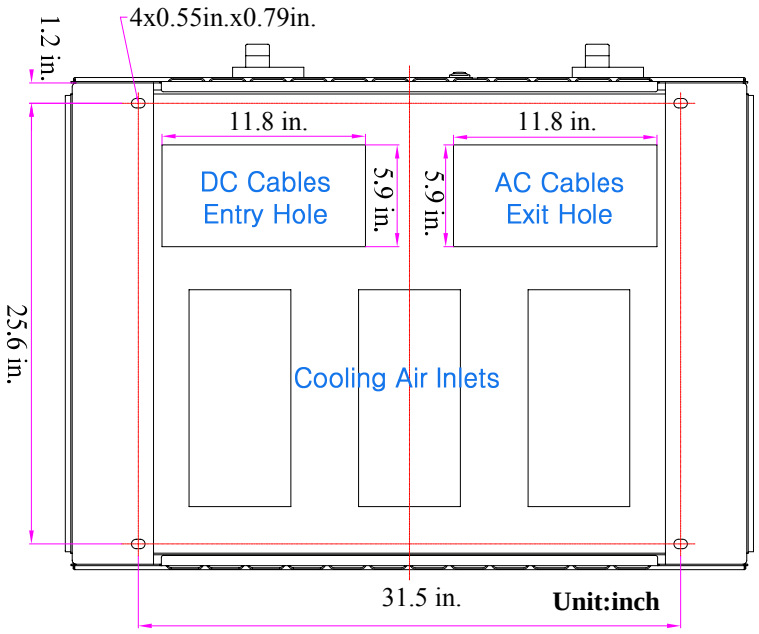


Fig 3-4 Bottom View of SG100KC

Cooling air is fed in via the base inlet and shutters on the front and rear panels. The cooling air outlets are on the top of the SG100KC. The consumption of the cooling fan is 240W and the outlet air flow is 60000ft^3/h (1620m^3/h), see Fig 3-5.

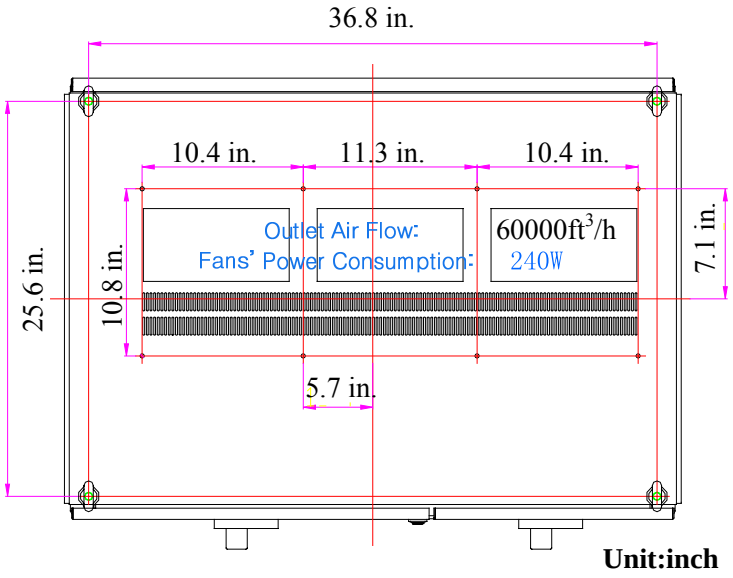


Fig 3-5 Top View of SG100KC

3.4 Electrical Connections Interface

The SG100KC provides multiple electrical terminals, see Fig 3-6.

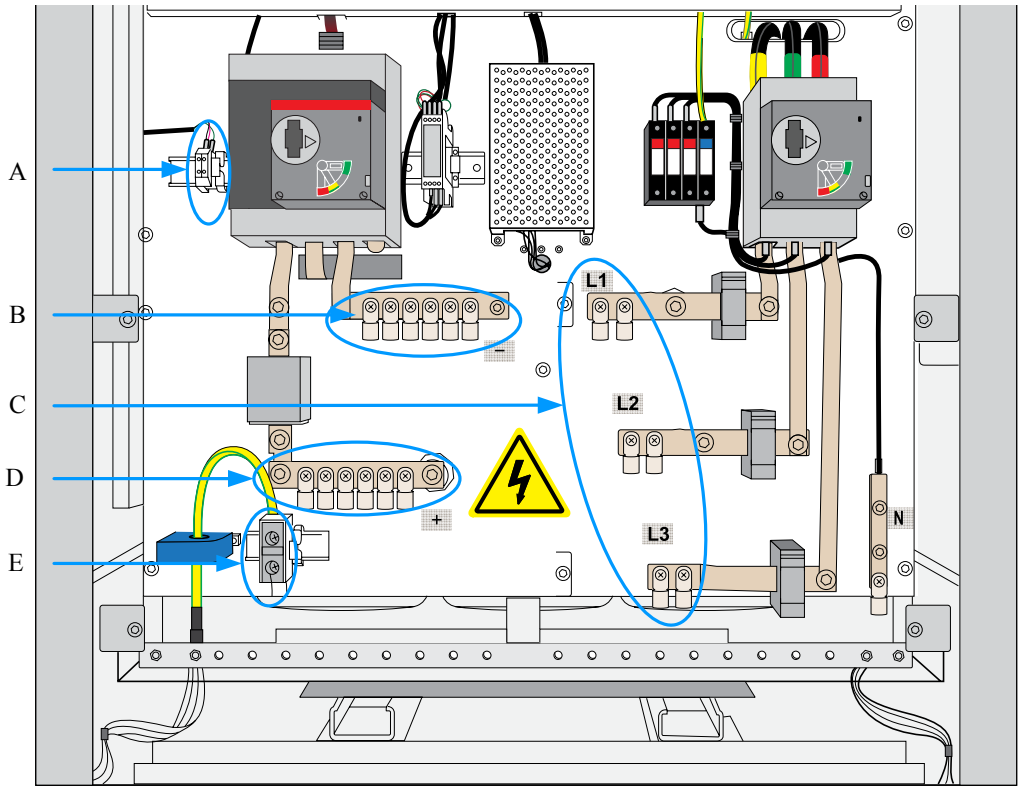


Fig 3-6 Electrical Connections Interfaces of SG100KC

No.	Name	Comments
A	RS485 Terminals	-
B	DC- Input Terminals	-
C	AC Output Terminals	To 3-phase Grid through AC main breaker. Leave N Vacant in 3-phase-3-wire grid system(Consult Local Distribution Company)
D	DC+ Input Terminals	-
E	Ground Terminal	Must be connected to protect operators from leakage current.

3.5 Data Acquisition

3.5.1 Data Display

The inverter will display real-time and logged running data of the inverter on the equipped LCD interface.

3.5.2 Fault Indication

The inverter can record the time and type of all faults in non-volatile memory and inform the fault state to the customers through LCD and LED.

3.5.3 Serial Data Access

All the data and fault information can be accessed by a remote computer via serial port communication when necessary.

The inverter has a basic RS485 communication method and can be extended to a variety of communication approaches, which includes Ethernet, Internet and GPRS by utilization of proper external adapters or modems.

3.6 General Requirements

3.6.1 Grid Requirements

The output of the SG100KC is designed to fit the 600V 3-phase-4-wire grid system, which includes L1, L2, L3, Neutral and power ground. 600V 3-phase-3-wire grid is acceptable. In 3-phase-3-wire grid, neutral terminal of SG100KC can be left vacant. (Consult Local Distribution Company)

3.6.2 Ventilation Requirements

Maintain a minimum of 24inch (600mm) clearance in back, 48inch (1200mm) in front and 24inch (600mm) on top of the SG100KC for proper ventilation and installation operation.

3.6.3 Installation Requirements

All installation practices on the SG100KC may only be performed when the device is safely de-energized of all the DC and AC power sources and all the power switches are locked out.

The SG100KC is designed with some fans for cooling and ventilation.

Work on the fans may only be performed after all insulation measures have been taken.

3.6.4 Personnel Requirements

Only qualified technical personnel, who are familiar with the installation of the system, may undertake any such work.

3.6.5 Communication Requirements

The basic communication interface of the SG100KC is the RS485 serial communication, which can be easily connected to a PC through a RS485/RS232 Converter.

An Ethernet method and GPRS method can be extended optionally with specific device, which can also be ordered from Sungrow.

4 Installation Design

About This Chapter

This chapter provides the PV plant system solution with optional devices from SUNGROW, information about how to design the installation environment, how to arrange installation procedure. Read this chapter to get information for installing the SG100KC.

4.1 The Solution with Optional Devices from SUNGROW

The PV grid-connected system configured with optional devices from SUNGROW is shown in Fig 4-1.

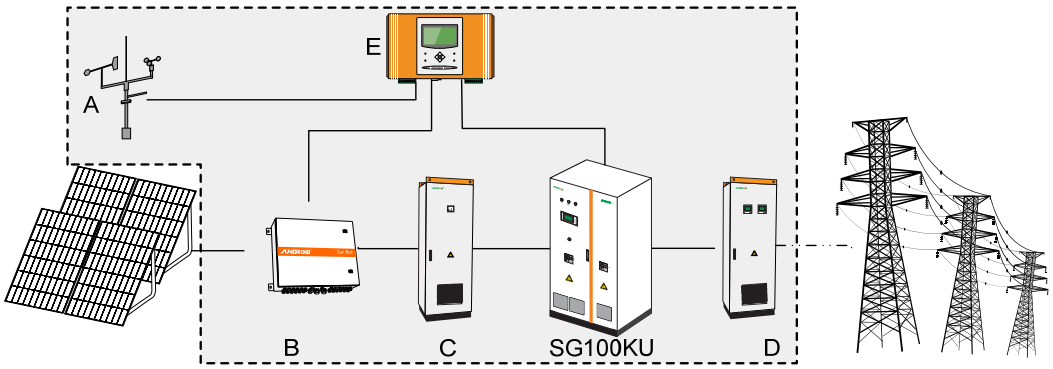


Fig 4-1 The Solution from SUNGROW

No.	Name	Comments
A	SunInfo EM Environment Monitoring Device	Applied to PV power generation system to measure the wind speed, wind direction and solar radiation.
B	SunBox PVS PV Array Combiner Box	By using PV array combiner box, different strings of PV array can be converged into the PV array string box. After that, together with lightning arresters and circuit breakers, it is connected to the inverter to reduce the system installation time and increase the system safety.
C	SunBox PMD-D DC Power Distribution Cabinet	The DC distribution unit collects the DC current from PV arrays and feeds into the inverter, which mainly contains DC input circuit breakers, diodes and PV lightning protection device.
D	SunBox PMD-A AC Power Distribution Cabinet	The AC distribution unit is a distribution and protection interface between inverter and the utility network, which contains grid-side circuit breaker, lightning protection devices and power meters.
E	SunInfo Logger Inverter Data Acquisition and Transmission Device	Data acquisition device is used for processing the data from PV power plants which can be communicated with the PV grid-connected inverter for PV power plants. It is capable of monitoring one singular inverter and even up to 100 inverters.

4.2 Basic Requirements

The following requirements listed below should be met to ensure the normal operation of the SG100KC.

- Avoid moisture and wet places.
- Install indoors and avoid sunlight and rain.
- Don't install the SG100KC in an unstable place.
- Install in a place where you can see the LED indicators or LCD display clearly.
- Ambient temperature range: -13°F～131°F (-25°C～55°C).
- Maintain spaces around the SG100KC for proper ventilation, installation operation and passage (escape route).
- Good ventilation and clean cooling air supply.

4.3 Installation Environment Design

NOTICE

There are air outlets on the top of the SG100KC. Therefore, at on-site field, air ducts must be installed to avoid foreign bodies' entry.

The SG100KC should be installed in an electrical service room. The floor, wall clearances, ventilation equipments and precaution devices should be designed by professional personnel and satisfy the following requirements.

4.3.1 Floor

The foundation must guarantee solid and safe positioning of the inverter. It must be able to provide the load-carrying capacity necessary to cope with the weight of the inverter.

The SG100KC is designed for indoor use only and must be placed on a level concrete floor or pad.

Any existing unevenness, depressions or slope must be corrected prior to installation.

Prior to placing the inverter, users should bear in mind that the cables should enter the inverter from underneath and through the cable entry holes.

4.3.2 Clearance Space

Maintain a minimum of 24inch (600 mm) clearance in back, 48inch (1200mm) in front and 24inch (600mm) on top of the SG100KC for proper ventilation and installation operation.

NOTE

The space from the top of the enclosure to the installation site ceiling must have enough clearance for ventilation and maintenance; otherwise maintenance personnel cannot open the top panel.

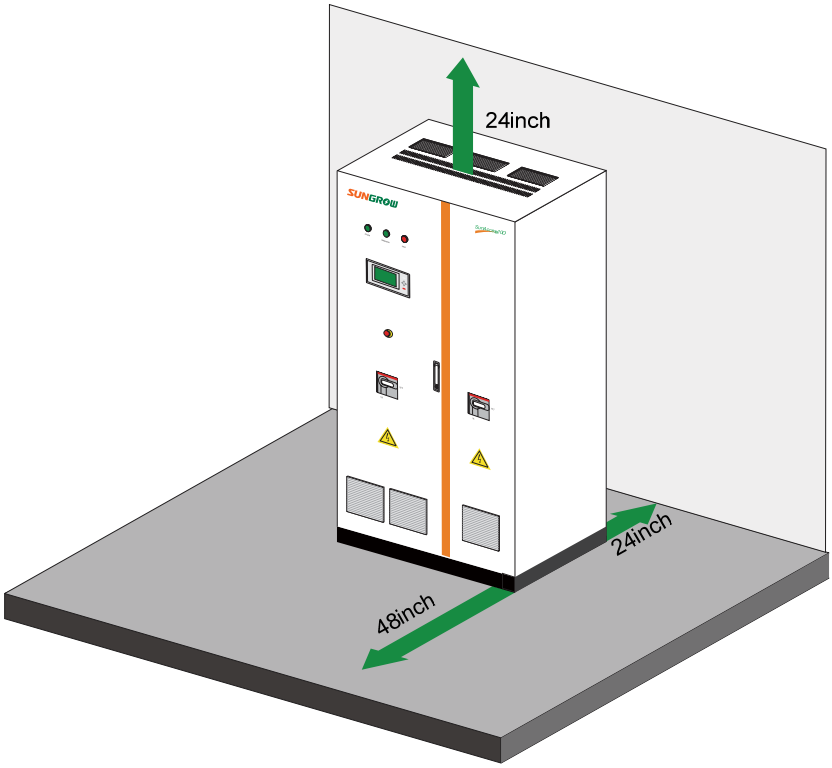


Fig 4-2 Clearance Space around the SG100KC

4.3.3 Cable Trench

The external cables of the SG100KC route into or out of the cabinet via the base. Cable trenches or steel supports above the floor are recommended (Refer to relevant design guides or standards).

NOTICE

Good electrical connection is needed between different cable trenches and GND terminals.

Cable support arms can be used to support cables. Signal cables should be separated from power cables with enough distance to avoid interference.

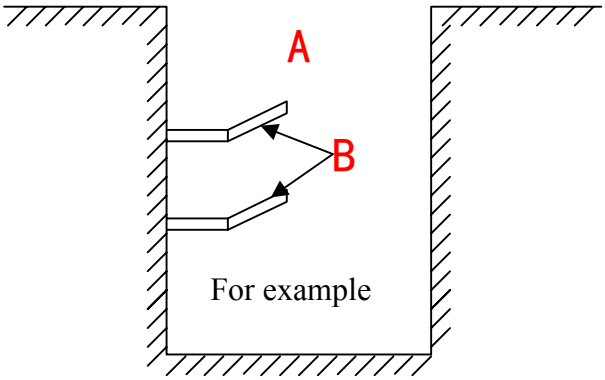


Fig 4-3 Sectional Drawing of Cable Trench

No.	Name
A	Cable Trench
B	Cable Support Arms

4.3.4 Ventilation

The heat generated (exhaust hot air) by the SG100KC must be dissipated out of the electrical service room efficiently, in order to guarantee safe operation and high feed-in power.

- High circulation of air is required.
- Plenty of fresh air should be available.
- Air should be pure and without dust (classification 3S2).
- Ventilation equipments are necessary, e.g. fans, blowers, ventilation grilles.
- Exhaust fans are recommended to keep the air pressure balance.
- Directions of air inlet and outlet should be designed according to the local wind direction.
- Measures for dust and rain-proofing of air inlet and outlet are necessary.
- The sizes of air pipes should be designed by professional personnel according to the air quantity.

4.3.5 Other Protections

The SG100KC has the Ingress Protection 20(TYPE 1) and should be installed in dry, clean industrial environment in accordance with EMC threshold and noise level.

CAUTION

During operating the SG100KC will make some noise (≤80db), install the SG100KC in industrial environment and avoid the vicinity to living area or office area.

After wiring, the cable entry and exit holes should be covered by the slid plates. And the remaining gaps should be filled by urethane foam so as to keep mice or other creatures from entering the cabinet.

NOTE

The installation location must be dry and should not contain any unexpected condensate water.

4.4 Wiring Specification

Cables in the SG100KC can be classified into either power cables or control (data) cables.

It is recommended that the power cable and control cables be installed on separate cable support arms. Avoid long parallel runs of the two kinds of cables so as to decrease electromagnetic interference.

Where control cables must cross power cables make sure they are arranged at an angle as near to 90° as possible. Do not run extra cables through the inverter.

The cable support arms must have good electrical bonding with each other and to the grounding electrodes. Aluminum cable support arm systems can be used to improve local equalizing of potential.

Table 4-1 shows the recommended minimum distances between different parallel lengths shielded control cables and power cable.

Table 4-1 Min. Distance between Control Cable and Power Cable

Parallel length (inch,m)	Min. Distances (inch,m)
7874 inch (200m)	12 inch (0.3m)
11811 inch (300m)	20 inch (0.5m)
19685 inch (500m)	48 inch (1.2m)

4.5 Tightening Torques and Cable Protection

4.5.1 Tightening Torques for Power Cable Connections

Tighten the cable with the proper torque shown in Table 4-2to prevent the loosening of cable lugs that may cause poor contact high contact resistance or even fire.

Table 4-2 Tightening Torques for Power Cable Connections

Screw size	Torque（in-Ibs, N • m）
M4	18 in-Ibs (2 N • m)
M5	28 in-Ibs (3.2 N • m)
M6	62 in-Ibs (7 N • m)
M8	142 in-Ibs (16 N • m)
M10	301 in-Ibs (34 N • m)

4.5.2 Cable Protections

- Protection of communication cable:
  - Communication cables are thin and easily to be broken. Lay power cables first then communication cables.
  - Communication cables should be laid in cable trench or cable support arms or tightened up by cable ties.
  - Avoid heating element and strong electric fields.
- Protection of power cables:
  - Strong electric currents remain in the power cables. Protect the insulating layer from sharp edges.
  - Bundle power cables together with insulated cable ties if necessary.

4.6 Installation Process

Fig 4-4 shows the installation process of the SG100KC. And Table 4-3 gives a description about it.

Table 4-3 Installation Process Descriptions

Process	Specification	Reference
Preparations before Installation	Checking the unit Required tools	5 Preparations for Installation
Mechanical Installation	Transport and shipping Field installation	6 Mechanical Installation
Electrical Connection	Open the door DC connections AC grid connections Ground connection Communication connection	7 Electrical Connection
Installation Check	Check mechanical installation Check electrical connection Others	8 Installation Checklist
Commissioning	Check before commissioning Preparations before start-up Start-up procedure Complete the commissioning	9 Commissioning

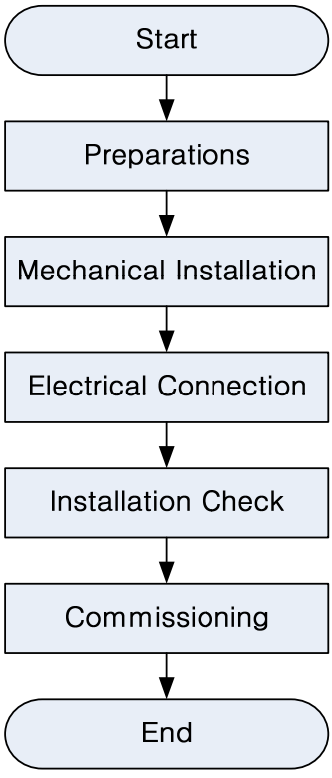


Fig 4-4 Installation Process of the SG100KC

5 Preparations for Installation

About This Chapter

This chapter illustrates preparations for installation of the SG100KC, including checking the unit and required tools.

5.1 Checking the Unit

The first thing users must do after receiving the unit is to check the packaging and the device for any possible damages and verify the contents of the delivery with the delivery list.

Please contact Sungrow immediately in case you find any visible damage or loss of the delivery components that are supposed to be included in the package.

Check whether there are signs of damages. Before installation and operation, check the information on the crate to verify whether the product is the correct type.

WARNING

Only an intact unit may be installed!

5.2 Required tools

The tools required for moving the unit to its final position, fastening it to the floor, and tightening the connections are listed below:

- Crane, fork-lift or pallet truck (check load capacity), rail steels, jack and rollers
- Torque wrench
- Screwdrivers for the tightening of the frame screws
- Set of wrenches and sockets
- Wire stripper
- Pliers
- Inner hexagon spanner
- Alcohol blast burner or hot air blower
- Mega-ohmmeter or multimeter

6 Mechanical Installation

About This Chapter

This chapter describes the mechanical installation procedure of the SG100KC.

6.1 Transport and Shipping

6.1.1 Attentions

WARNING

The SG100KC inverter should be transported or installed as an integrated unit. Never disassemble it without the permission of SUNGROW.

WARNING

Always keep the SG100KC upright!

Avoid sudden force!

CAUTION

Only specific transport methods for the SG100KC are acceptable. And note the heavy weight of the equipment and the non-central center of gravity.

CAUTION

The SG100KC inverter weighs at least 1984 lbs (900kg). Please take this heavy weight into consideration during shipping and moving.

NOTE

Lay the power cables before the mechanical installation of the SG100KC.

6.1.2 Moving the Packed SG100KC

Pay attention to the symbols and data on the crate, to make an informed choice on modes of transport and installation site, see Table 6-1.

Table 6-1 Symbol and Data Name on Crate

Symbol or Data Name	Specification
	THIS END UP KEEP UPRIGHT
	FRAGILE
	KEEP DRY CAUTION AGAINST WET
MODEL NO.:	Type of the inverter
SIZE:	Package Dimensions
N. W.:	Net Weight
G. W.:	Gross Weight

Use a forklift or crane to move the crated SG100KC.

- It is recommended to transport the SG100KC using a forklift, see Fig 6-1 A:
  - Insert the forks of the forklift to the bottom of wooden crate.
  - Elevate the SG100KC from beneath the wooden crate.
- Use a crane to move the wooden crate, see Fig 6-1 B:

NOTE

Flexible slings with lock catches on both ends are recommended.

You can buy the slings from SUNGROW.

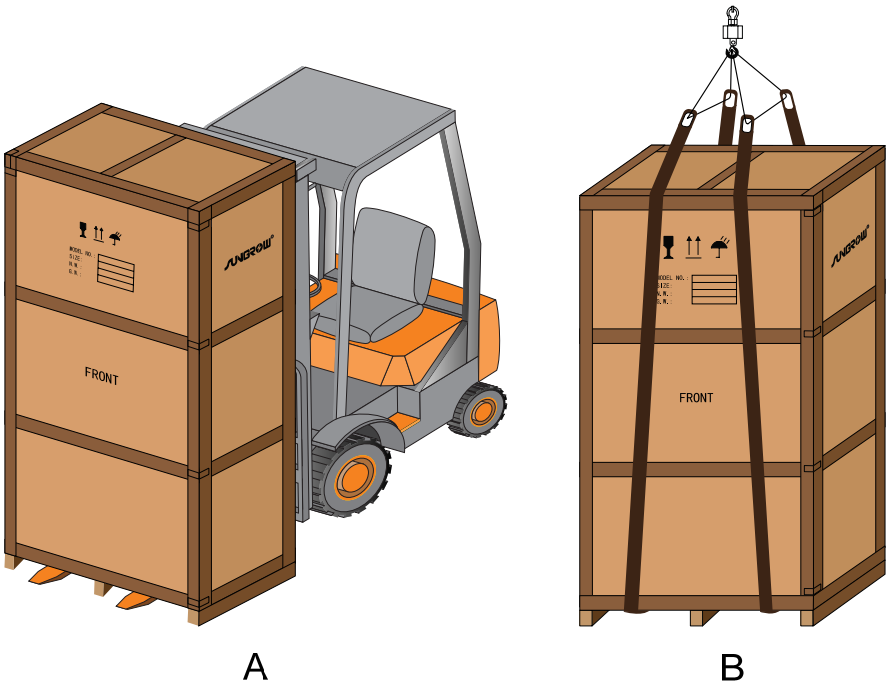


Fig 6-1 Moving the Packaged SG100KC

Move the SG100KC after Unpacking

You can use a forklift, rail steels or crane to move the SG100KC after unpacking.

- If the unpacked SG100KC is far from the final position, you can use the wooden pallet to move the SG100KC, see Fig 6-2.

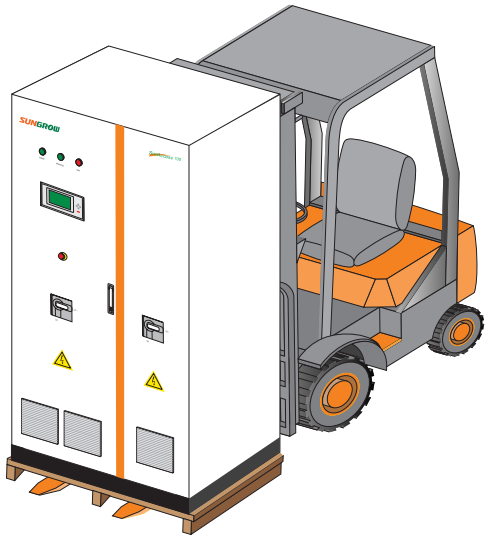


Fig 6-2 Moving the SG100KC with the Wooden Pallet Using a Forklift to

- To move the SG100KC using a forklift follow the procedures, see Fig 6-3:

1. Remove the front and rear base covers.
2. Insert the forks of the forklift below the SG100KC at the points specified.
3. Lift the SG100KC from beneath the enclosure.

   Be sure to use a forklift with a sufficiently spaced fork span.

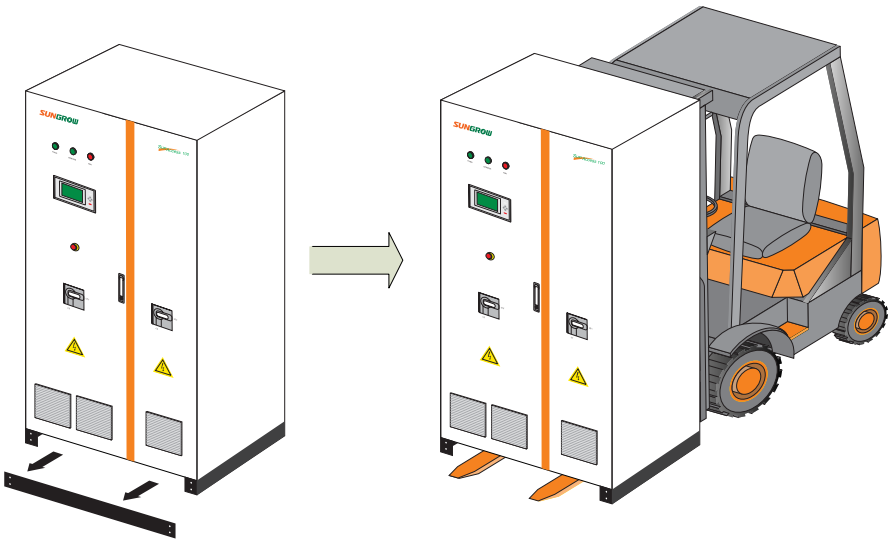


Fig 6-3 Moving the SG100KC Using a Forklift

- Move the SG100KC in place with rail steels; see Fig 6-4 A.

NOTE

Lubricant can be sprayed on the surface of the rail steels to make moving the unit easier.

- If you can move the SG100KC only using a crane, you can order the angle irons and relevant parts free of charge; see Fig 6-4 B.

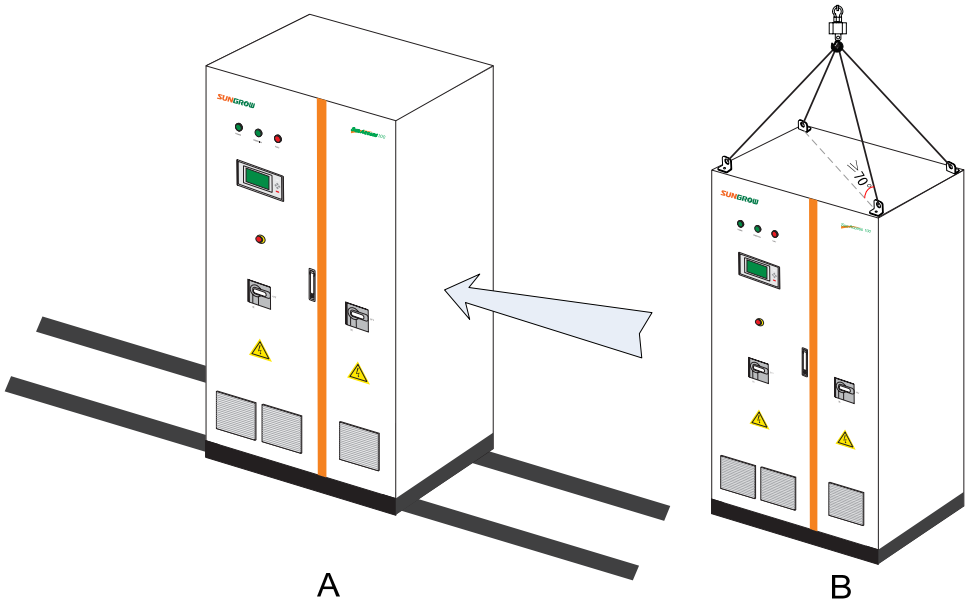


Fig 6-4 Moving the SG100KC Using Rail Steels or Crane

6.2 Field Installation

6.2.1 Unpacking the Unit

To unpack the SG100KC from the shipping crate:

1. Remove the wood side and top panels of the crate.
2. Remove the barrier bag material from the inverter.
3. Remove the anchor hardware which screws the inverter to the pallet.
   - Remove the front and rear base covers.
   - Unscrew the nuts under the wooden pallet.
   - Pull up the bolts.

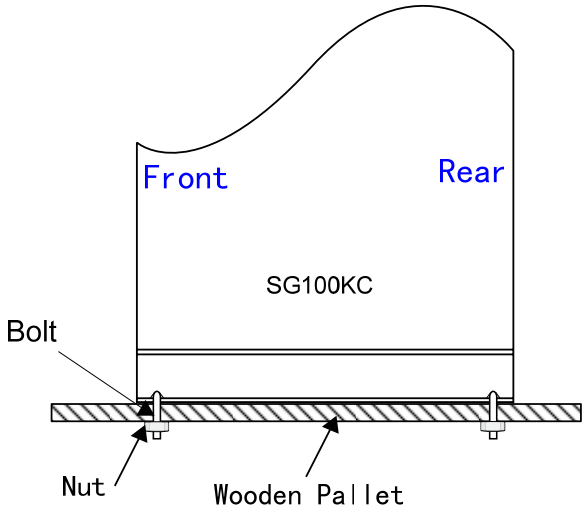


Fig 6-5 Cross-section View of the SG100KC Fastened on the Wooden Pallet

6.2.2 Place the SG100KC

To place the enclosure on the mounting surface:

1. Make sure the mounting surface is level.
2. Move the SG100KC into position.

6.2.3 Fastening the SG100KC to Floor

The SG100KC must be fastened to the floor as follows:

1. Remove the front and rear base covers.
2. Fasten the cabinet to the channel steels or floor with M12 bolts and nuts, see Fig 6-6.

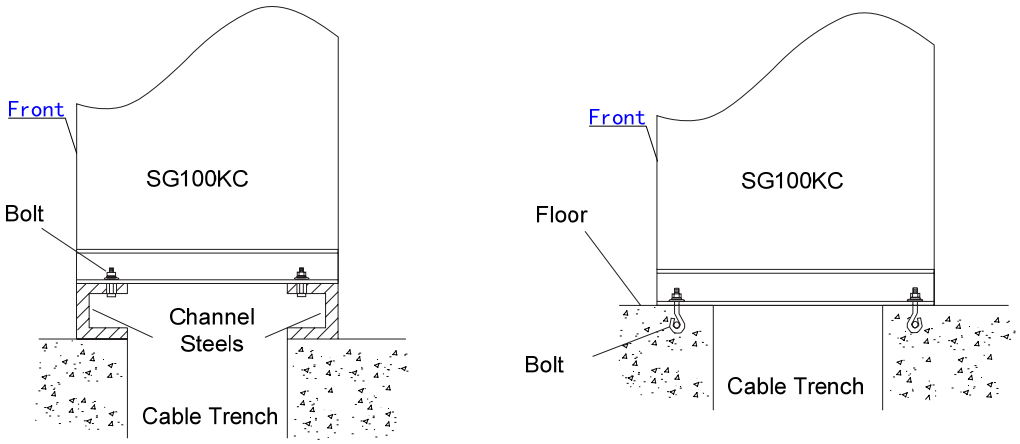


Fig 6-6 Fastening the SG100KC

7 Electrical Connection

About This Chapter

This chapter describes the step-by-step procedure for electrical connection to complete the installation of the SG100KC.

7.1 Cable Specifications

NOTE

All wiring methods and processes should be in accordance with Local Electrical Codes.

The DC input cables (including DC positive and DC negative) must be chosen according to the recommended rating below.

Table 7-1 Recommended Sizes for DC Cables

Cables and Bolt	Requirements (mm^2)	Requirements (AWG)
DC + cable	At least 2 input cables with each 70 mm^2	1/0
DC- cable	At least 2 input cables with each 70 mm^2	1/0
M8 Bolt (DC + and DC-) Torque: AWG 5 (16N.m)		

The AC output cables (including L1, L2, and L3) must be chosen according to the recommended sizes below.

Table 7-2 Recommended Sizes for AC Cables

Cables and Bolt	Requirements (mm^2)	Requirements (AWG)
Grid phase L1 cable	70 to 85	2/0 to 3/0
Grid phase L2 cable	70 to 85	2/0 to 3/0
Grid phase L3 cable	70 to 85	2/0 to 3/0
Grid phase N cable	70 to 85	2/0 to 3/0
M8 Bolt (L1, L2, L3) Torque: 16N.m		

The ground cables must be chosen according to the recommended sizes below.

Table 7-3 Recommended Sizes for Ground Cables

Cables and Bolt	Requirements (mm^2)	Requirements (AWG)
Ground cable	16	5
Earthing resistance should be less than 10 Ω or complies with the appropriate standard..		

The communication cables must be chosen according to the recommended sizes below.

Table 7-4 Recommended Sizes for Communication Cables

Cable	Requirements (mm^2)	Requirements (AWG)
Communication cable	0.75	18
Shield cables are recommended.		

Based on the above tables, users should use proper cables for different terminals with different specifications.

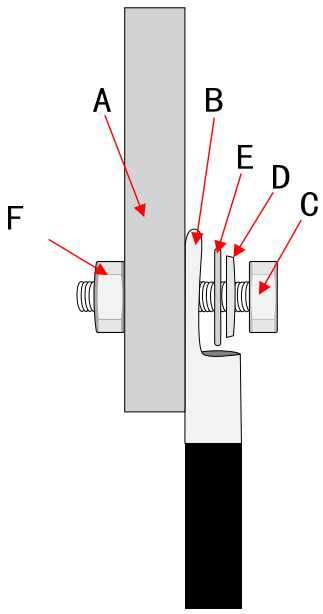
7.2 Parts for Cabling

The parts for connecting power cables are provided on the copper bases. The sequence of the parts is shown in Fig 7-1.

DANGER

Incorrect connection of power cables will cause fires.

Follow the sequence when connecting the power cables.



No.	Name
A	Copper Bus
B	Power Cable Lug
C	Bolt
D	Locking Washer
E	Washer
F	Nut

Fig 7-1 Power Cable Connection Terminal

7.3 Start Electrical Connections

7.3.1 Open the Door

The SG100KC is stopped and latched once shipping; users must open the front door of the SG100KC for wiring.

1. Switch off both the AC and DC main switches (turn both switches counter-clockwise).

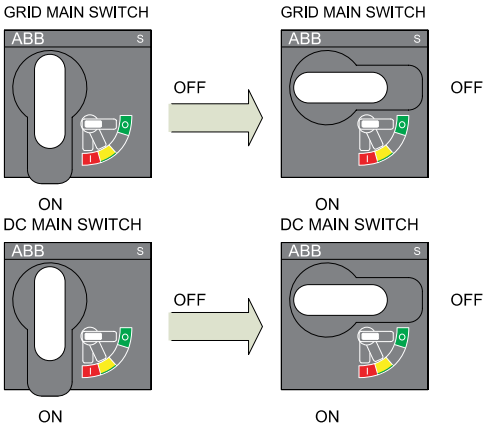


Fig 7-2 Open the Main Switches

2. Press down the doorlock to release the latch handle and turn the handle clockwise.

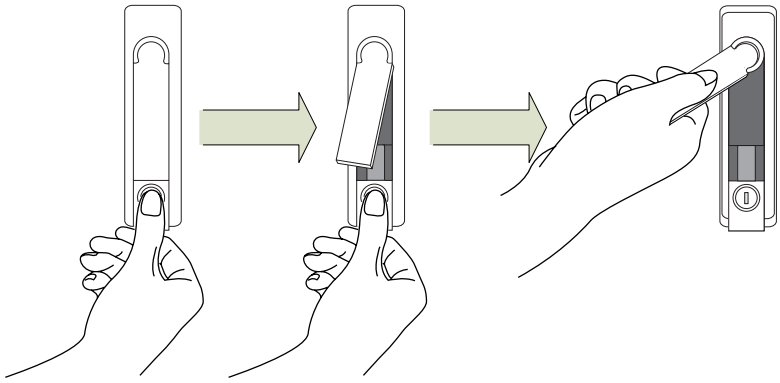


Fig 7-3 Open the Latch

3. First open the left half door and then the right half door, identify the 2 transparent plastic shields (one in the upper position and one in the lower position).
4. It is necessary to take down the lower protective shield for wiring.
   Note that there are 4 screws indicated by the blue circles to fix the shield. Loosen and remove them all. See Fig 7-4.

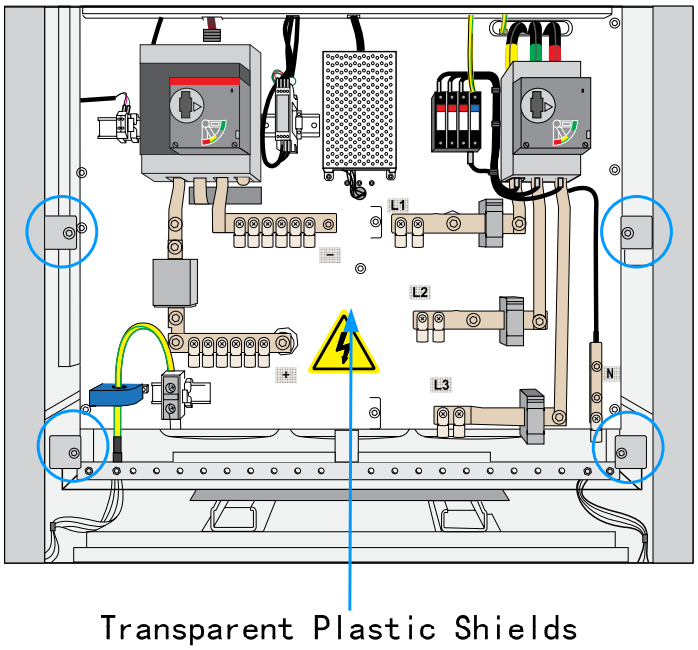


Fig 7-4 Remove the Protective Shield

7.4 Open the Cable Holes

The external cables are routed into or out of the cabinet via the cable holes at the bottom the SG100KC. The corresponding sliding plates should be removed for wiring.

1. Turn the screws in the back of the sliding plate counter-clockwise
2. Slide the plates backwards to open the holes.

CAUTION

The protective sponge tapes on the sliding plats protect the cables from being scratched. Do not remove!

7.5 DC Connections

The DC input copper bus is located in the lower left corner of the inverter; there are 6 DC inputs in the DC copper bus with DT70 lugs.

Cables rated for a minimum of 600V are required for connecting the inputs of the inverter.

CAUTION

Because the maximum DC current may reach to 340A and the connection terminals are M8 lugs, at least two AWG 1/0 (70mm^2) DC input cables for each DC pole are required for the large current.

CAUTION

The DC cables to be connected must be rated for a minimum of 600V.

Be careful not to connect the wrong DC input pole.

CAUTION

The voltage of the PV array must never exceed the maximum permissible inverter input voltage of 600V.

1. Ensure that the DC cables have no electric current.
2. Route the DC cables through the cable entry holes to the DC terminals, see Fig 7-5.
3. Connect the cables to DC (+) and DC (-) terminal on the DC circuit breaker respectively, refer to Fig 7-1.
4. Attach the DC cables to the terminals with the appropriate screws.

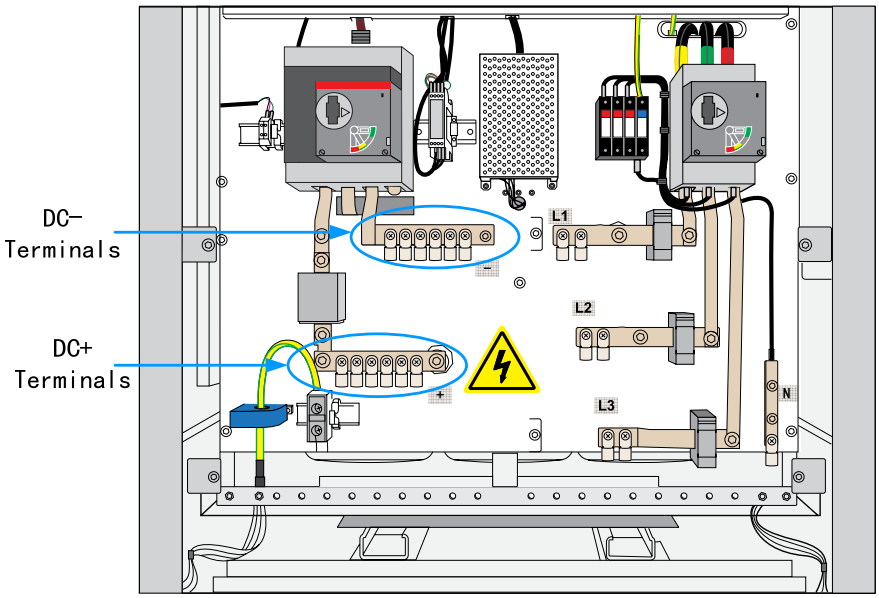


Fig 7-5 DC Input Cable Routing

NOTE

DC- grounding is required by contract. The DC- terminal in connected to the ground copper bus by leakage current sensor. Therefore it is needed to firmly attach PE copper bar to primary grounding system.

7.6 AC Grid Connections

CAUTION

To reduce the risk of fire, connect only to a circuit provided with a 340A maximum branch circuit over current protection.

NOTE

When connecting external AC cables to the SG100KC, you must follow the positive phasing sequence throughout the installation process.

The connection terminals are located in the lower right corner of the cabinet. The connection process is as follows:

1. Ensure that the AC grid cable has no electrical current.
2. Route the Line Grid L1, L2, L3 and Neutral cables through the cable holes to the AC terminals, see Fig 7-6.
3. Connect the cables to terminals marked L1, L2, L3 and N respectively, refer to Fig 7-1.
4. Secure the AC Line cables to the terminal with screws.

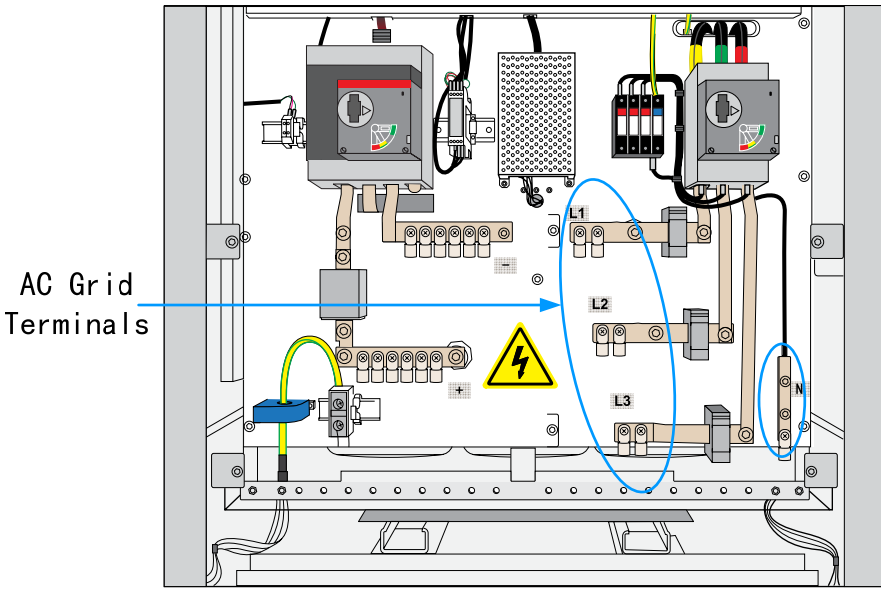


Fig 7-6 AC Output Cable Routing

NOTE

Note that the AC grid connection is designed to fit the 3–phase grid, which must be provided by the end-user, using a 3-phase 600 V system.

In a 3-phase-3-wire system, the “N” terminal should be vacant. (Consult Local Distribution Company.)

7.7 Ground Connections

It is crucial to connect all inverters to ground via appropriately sized conductors.

The PE copper bar has been firmly connected to the enclosure of inverter inside the SG100KC before the delivery. Therefore, it is necessary to firmly attach the PE copper bar to grounding electrode.

The cross sectional area of grounding cable is AWG 5 (16mm^2). The grid impedance must not exceed 10Ω or complies with the appropriate standard.

CAUTION

If there is another inverter in parallel connection, a single-core yellow-green cable of at least AWG 5 (16mm^2) is needed to connect the enclosure of all inverters to make equipotential for them all.

This will avoid a current in the shielding layer of the communication cable due to different potentials.

Connect the factory ground to the ground terminal with a leaking current detector to measure the leaking current detection function. See Fig 7-7 .

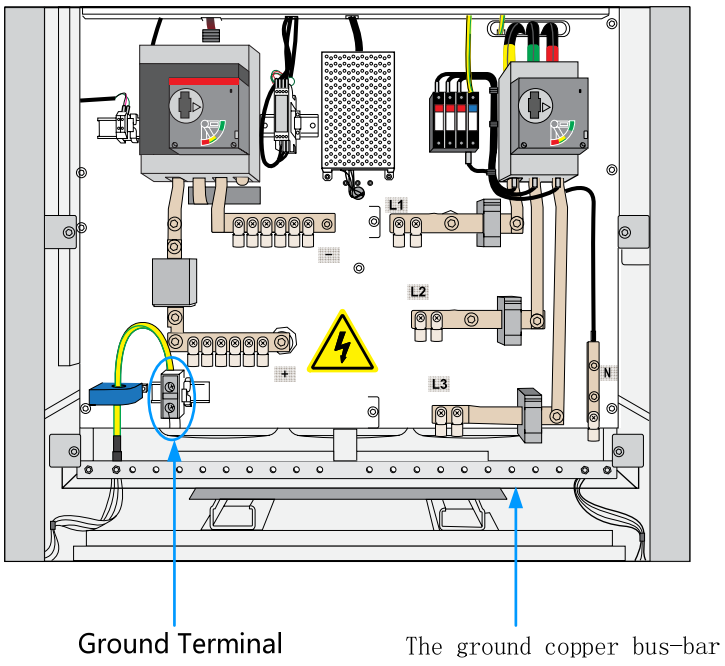


Fig 7-7 Ground Cable Routing

WARNING

This product can cause a DC current in the external protective earthing conductor. A residual current-operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact.

7.8 Communication Connection (Optional)

The SG100KC supplies the RS485 interface to facilitate communication between inverter and a PC or a data logger. There is also an RS485/RS232 converter needed to connect the SG100KC to a PC.

1. Route the communication cables through the cable entry holes to the RS485 A/B terminals, see Fig 7-8.
2. Route the RS485A cable to the RS485/232 converter TX+ or RX+.
3. Route the RS485B cable to the RS485/232 converter TX- or RX-.
4. Secure the cables by tightening.
5. Connect the RS485/232 converter DB9 to the PC DB9 serial port, see Fig 7-9.

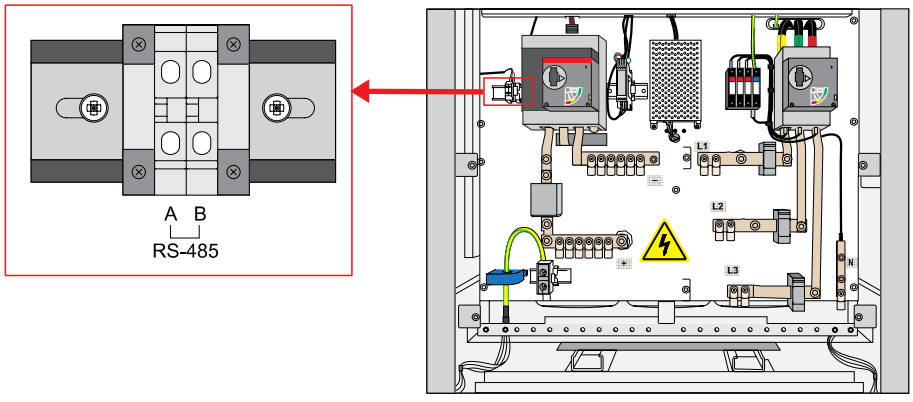


Fig 7-8 Serial Communication Cable Routing

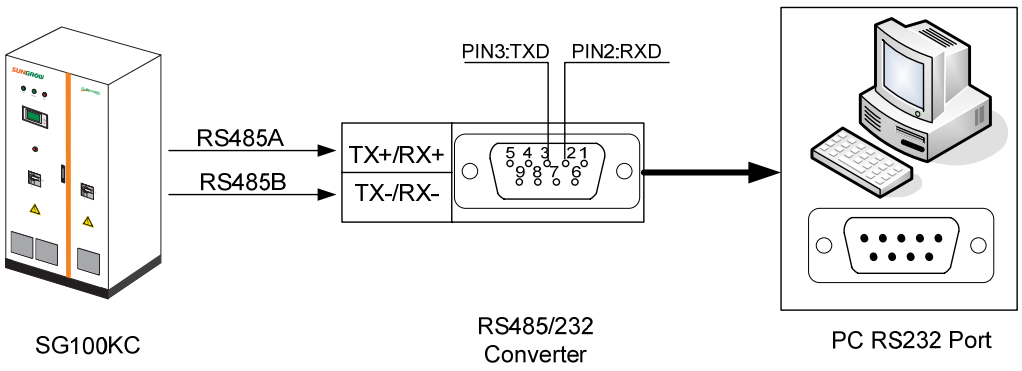


Fig 7-9 Serial Communication Interface Connection

If there are two or more inverters to be monitored, install a communication system in series.

NOTE

- RS485 cable should be a shielded twisted-pair for good communication （RVVP-2*1.0 shielded twisted-pair cable is recommended）.
- Shielding layer of RS485 cable should be grounded by means of single point in the site of the monitor terminal.

7.9 Close the Cable Holes

After all the electrical connections are completed, the cable holes must be closed to protect the interior against dirt, soil and creatures.

1. Slide the plates forward until the flexible sponge seals are pressed against the cables.
2. Turn the screws in the back of the sliding plate clockwise to fix the sliding plates.
3. Seal the rest of the gaps with urethane foam.

8 Installation Checklist

About This Chapter

This chapter describes the items needed to verify whether the installation for the SG100KC is correct.

Check the mechanical and electrical installation of the inverter before commissioning. Go through the checklist below with another person.

Mechanical Installation	
☐	Check all the mechanical connections and make sure there are no damages, scratches or abnormal parts.
☐	The inverter has been fixed properly to the floor.
☐	The clearance spaces around the inverter are proper.
☐	The ambient operating conditions are within the allowed limits.
☐	Cooling air circulates smoothly.
☐	The protective enclosure seal is integral and reliable.
Electrical Installation	
☐	The inverter is grounded properly.
☐	The polarity of the PV input connections is correct.
☐	The grid voltage matches the nominal input voltage of the inverter.
☐	The grid connected to the output terminals is OK.
☐	The communication cable connections are correct.
☐	The communication cables are routed away from the power cables.
☐	Marks on the cables are correct, clear and distinguishable.
☐	Insulation shields are integrated and firm.
☐	Warning signs are clear and distinguishable.
☐	Make sure all the bolts that fix the cables are tightened and secured.
Other	
☐	There are no tools, foreign objects or dust from drilling inside the inverter.
☐	There is no condensate water or ice in the cabinet.

9 Commissioning

About This Chapter

This chapter describes how to start the SG100KC for the first time, including requirements for commissioning, inspection before start-up, start-up procedures and completion of the commissioning.

9.1 Requirements of Commissioning

WARNING

Before starting the device for the first time, all operations related to the device should be checked carefully.

NOTICE

Check to make sure the voltages in both AC and DC meet the requirements of the SG100KC.

9.2 Inspection before Start-up

9.2.1 PV Array Check

Before start-up, check the PV array:

1. Check open-circuit voltage of each PV string matches the nominal input voltage.
2. Record the U-I curve if possible.
3. Record the environmental parameters(temperature, radiation intensity)
4. Measure and record the resistance of cables if possible.

9.2.2 SG100KC Check

Before start-up check the SG100KC:

1. Ensure that the mechanical and electrical installation of the inverter has been checked according to ***8 Installation Checklist***.
2. Ensure that the DC and AC (GRID) Main switches are in OFF position.
3. Ensure that the Emergency Stop Button is released and works.

9.2.3 Ground Connection Check

Make sure that ground cable goes through the hole of the ground fault detection device and is connected to the factory ground securely.

9.2.4 Serial Communication Check (Optional)

For external communication monitoring, the data cables must be connected. Make sure that the RS485 A and B cables are connected correctly and tightened to the RS485/232 converter.

Make sure the RS485/232 converter DB9 terminal is correctly connected to the PC DB9 serial port.

9.2.5 Voltages Check

AC Grid Voltage Check

It must be verified that the inverter is connected to the correct grid type and that a right-hand rotary field exists on L1, L2, L3 and Neutral. The value of the AC line to line voltage should be about 600 V.

DC Voltage Check

The DC connections are from the DC combiner boxes to the inverter.

The voltage on the individual DC cables should be substantially the same value and must never exceed the allowable maximum DC voltage.

Besides the voltage values, the polarity of the DC inputs must also be verified. All DC connections should be checked to ensure that they are mechanically tight.

The DC cables to be connected must be rated for a minimum of 600V.

9.3 Start the Inverter

If all tests and measurements are completed, and all measured values are within the acceptable range, the device can be switched on for the first time.

Before starting up the SG100KC, ensure that:

- **Nobody is working on the inverter.**
- **Cabinet doors are closed.**

To start the SG100KC:

1. Verify 600 VAC voltage of the grid line to line voltage.
2. Close the door of the enclosure.
3. Turn the AC (GRID) main switch to the ON position.
4. Turn the DC main switch to the ON position.
5. It will take about 1 minute for the auto-initialization of both the power conversion circuit and the LCD panel. The "**POWER**" LED indicators both in the enclosure and in the LCD panel will be on; the "com" LED indicator will flash every 2 or 3 seconds.
6. If the DC voltage is below the DC voltage start point (Vpv<320V), then the "state" of the LCD interface will always show "**Start-up**";
7. If the DC voltage exceeds the DC voltage start point (Vpv >320V) for 5 minutes, the SG100KC will automatically change to "**Run**" state, the "**OPERATION**" LED on the front door and the "**RUN**" LCD both will be on, with the state of the LCD menu be changing to "**Run**".
8. After the SG100KC entering normal operation, set the time to local time via LCD control panel, refer to the User Manual.

NOTE

Desynchronized time between the inverter and upper PC in the communication system may result in data record failure.

9.4 Complete the Commissioning

If you perform all the start procedures, check the operating condition of the SG100KC.

1. Check whether there is abnormal noise, heat generation, smoke or smell.
2. Measure the grid-connected voltage, current and THD.
3. Check the ground of cabinet.
4. Check the LCD display and external communication.

So far, the commissioning of the SG100KC is completed.

CAUTION

The SG100KC does not need manual control in daily operation.

- **Keep the door closed and locked.**
- **The door key must be kept by appointed personnel.**

10 Appendix

About This Chapter

This chapter gives technical data of the SG100KC, exclusion of liability and the way to contact us.

10.1 Technical Data

The following tables list the technical data of the SG100KC. Basic production information and performance of the SG100KC are available from these tables.

10.1.1 DC Parameters

Parameter	Specification
Max. DC Voltage	600Vdc
Start Voltage	320Vdc
MPP Voltage Range	300~600Vdc
Min. DC Voltage	300Vdc
Max. DC Power	105kWp
Max. Input Current	340A
Recommend PV Array Open Circuit Voltage	450V

10.1.2 AC Parameters

Parameter	Specification
Rated Output Power	100kW
Max. AC Output Current	105A
Rated Grid Voltage	600Vac
Grid Voltage Range	528V~650Vac
Rated Grid Frequency	60Hz
Grid Frequency Range	59.3Hz~60.5Hz
Output Current THD	< 3% at nominal power
Power Injection	<0.5% of rated inverter output current
Power Factor ($\cos\phi$)	1

10.1.3 System

Parameter	Specification
Max. Efficiency	97.2%
CEC Weight Efficiency	96.5%(with transformer)
Protection Degree	IP20 (Indoor) (TYPE1)
Power Consumption at Night	<30W
Operating Temperature	-25°C ~ 55°C (-13~+13°F)
Cooling Method	Controlled force-air cooling
Relative Humidity	0~95% Non-condensing
Max. Working Altitude	6667 ft (2000m)

10.1.4 Display and Communication

Parameter	Specification
Display	LCD
Communication	RS485, Ethernet(Optional)

10.1.5 Mechanical Parameters

Parameter	Specification
Dimensions(W×H×D)	40inchx77inchx30inch (1020mmx1964mmx770mm)
Weight	1984lbs (900kg)

10.2 Exclusion of Liability

The contents of these documents are checked and revised periodically. When necessary, please call us or visit our website www.sungrowpower.com for the latest information. However, discrepancies cannot be excluded. No guarantee is made for the completeness of these documents. Please contact our company or distributors to get the latest version.

Guarantee or liability claims for damages of any kind are excluded if they are caused by one or more of the following:

- Improper, inappropriate use or installation of the product.
- Installing or operating the product in an unintended environment.
- Installing or operating the product when ignoring relevant safety regulations in the deployment location.
- Ignoring safety warnings and instructions contained in all documents relevant to the product.
- Installing or operating the product under incorrect safety or protection conditions.
- Altering the product or supplied software without authorization.
- The product malfunctions due to operating attached or neighboring devices beyond allowed limit values.
- In case of unforeseen calamity or force majeure.

The use of supplied software produced by Sungrow Power Supply Co., Ltd.. is subject to the following conditions:

- Sungrow Power Supply Co., Ltd. rejects any liability for direct or indirect damages arising from the use of the SunInfo software. This also applies to the provision or non-provision of support activities.
- Using the SunInfo software for commercial purposes is prohibited.
- Decompiling, decoding or destroying the original program, including SunInfo software and the embedded software, is prohibited.

10.3 About Us

Sungrow power supply is a Chinese leading manufacturer of various power electronics products for renewable energy generation systems. Our products include converters, inverters, battery chargers and other power supplies for distributable generation systems in both grid-connected and stand-alone applications. The power rating of Sungrow products covers a range from several hundred watts to large mega-watt systems.

Sungrow is dedicated to help our customers acquire stable and clean power with minimum cost, maximum reliability and enhanced safety.

Contact Information

If you have any questions about this product, our hotline will be happy to assist you. Please keep the following data when contacting Sungrow.

Company:	Sungrow Canada Inc.
Website:	www.sungrow.ca
Contact:	Mr. Yabin Xing
Email:	info@sungrow.ca, service@sungrow.ca
Address:	895 Edgely Blvd., Vaughan, Ontario, Canada
Postal Code:	L4K 4V9
Telephone:	1-905-760-8618
Fax:	1-905-760-1158

SUNGROW

Green and Effective

Sungrow Power Supply Co., Ltd.

Add: No.2 Tianhu Rd., New & High Technology Industrial Development Zone, Hefei, P.R.China.
Contact: Mr. Henry (Director of International Trade)
Zip: 230088

Web: www.sungrowpower.com
E-mail: info@sungrow.cn
Tel: +86 551 532 7834/532 7845
Fax: +86 551 532 7856

Specifications subject to change without notice.